

Case 3450***Chrysophanus florus* Edwards 1884 (currently *Lycaena florus*) (Insecta, Lepidoptera, LYCAENIDAE): conservation of the specific name by designation of a neotype for *Polyommatus castro* Reakirt, 1866 (currently *Lycaena castro*)**

James A. Scott

60 Estes Street, Lakewood, CO 80226–1254, U.S.A.
(e-mail: JameScott@juno.com)

Abstract. The purpose of this application, under Article 75.5 of the Code, is to conserve the widely used name *Chrysophanus florus* Edwards, 1884 (currently *Lycaena florus*) for a butterfly species from North America by designating a neotype for *Polyommatus castro* Reakirt, 1866. The identity of *Polyommatus castro* (currently *Lycaena castro*) is uncertain because its lectotype is similar to the widespread lowland *Lycaena helloides* (Boisduval, 1852) in one trait and similar to the high-altitude Rocky Mountains butterfly *Lycaena florus* (Edwards, 1884) in another trait, and it lacks precise locality data that could have indicated its identity. A male of *L. helloides* is proposed as the neotype of *L. castro*, which will both fix the identity of *L. castro* as *L. helloides*, a synonymy accepted for 102 years, and conserve the name *Chrysophanus florus* Edwards, 1884 (currently *Lycaena florus*), which has been used for 125 years for the high-altitude butterfly and has been used in most of the scientific papers on the species.

Keywords. Nomenclature; taxonomy; Insecta; Lepidoptera; LYCAENIDAE; *Lycaena*; *Lycaena castro*; *Lycaena florus*; *Lycaena helloides*; *Lycaena dorcas*; coppers; Rocky Mountains.

1. Kirby (1837, p. 299, pl. IV, fig. 1) proposed the name *Lycaena dorcas* for a butterfly in boreal North America.

2. Boisduval (1852, p. 291) proposed the name *Polyommatus helloides* for a widespread North American butterfly.

3. Reakirt (1866, pp. 148–149) proposed the name *Polyommatus castro* for a Colorado butterfly.

4. Edwards (1884, pp. 210–211) proposed the name *Chrysophanus florus* for a Canadian Rocky Mountains butterfly.

5. *Chrysophanus florus* is the long-established name of a butterfly occurring in the higher Rocky Mountains of western Canada and the United States that has generally been considered to be a valid species or subspecies. *Chrysophanus florus* (currently *Lycaena florus*) has been treated as a subspecies of *Lycaena dorcas* by Dyar (1902, p. 41), McDunnough (1922, p. 136), Field (1936, pp. 25–26), Ferris (1977), Bird & Ferris (1979), Miller & Brown (1979, p. 28; 1981), Miller (1981), Bird et al. (1995), Layberry et al. (1998), Koçak & Kemal (2007) and Pelham (2008); as a synonym of *L. dorcas* by Klots (1936, p. 159), dos Passos (1964) and Guppy & Shepard (2001); as

a subspecies of *Lycaena helloides* by Barnes & Benjamin (1926), Leussler (1935, p. 58), McDunnough (1938), Brown et al. (1957, p. 156), Brown (1969), Opler (1975, p. 314) and Scott (1979, 1986, p. 389); and as a variety or form of *L. helloides* by Holland (1931). Chambers (1963) suggested *L. florus* might not be a synonym of either *L. dorcas* or *L. helloides*. Shapiro (1974, p. 40) considered the status of *florus* to be uncertain. Kondla & Guppy (2002, pp. 1–3) and Threatful (2003, p. 11) treated *Lycaena florus* as a valid species. It is no longer considered to be conspecific with either *Lycaena helloides* or *Lycaena dorcas* (Scott et al. 2006; Wright, 2008; Scott, 2006, 2008a, 2008b, 2008c).

6. *Polyommatus castro* was treated as a distinct species after its original description in 1866 and for nine years thereafter (Kirby, 1871; Mead 1875). Then for the next 102 years it was considered to be a synonym of *L. helloides* and so did not appear in local faunal lists and was only cited in synonymy (Scudder, 1876; Strecker, 1878; Dyar, 1902; Barnes & McDunnough 1917; Holland, 1931; McDunnough, 1938; dos Passos, 1964; Tietz, 1972. Barnes & Benjamin (1926) considered that *Polyommatus castro* is a junior synonym of *Lycaena helloides*, and Benjamin even labelled a specimen of *L. helloides* as lectotype of *Polyommatus castro*, but they never published this 'lectotype' labelling. A male paralectotype (Ferris, 1977, fig. 69) of *Polyommatus castro* that is obviously *L. helloides* (identified by Barnes & Benjamin and J. Scott) has a museum label that reads 'Heodes castro Reak Lectotype male Br Benj.' (Ferris, 1977, fig. 69). This label was apparently written by Benjamin when he was William Barnes's curator in 1922–1927 (the red-lined label and its handwriting including the unique ϵ -like e's are identical to dozens of such labels that also include the year 1925 and initials FHB for Foster Hendrickson Benjamin published by Emmel Emmel & Mattoon, 1998) (the other labels were evidently written by T. Reakirt about 1866).

7. The identity of *Polyommatus castro* Reakirt, 1866 is uncertain. The existing lectotype and four paralectotypes are of two different species, *Lycaena florus* and *Lycaena helloides*. The type series consists of three males and two females (now in the McGuire Center for Lepidoptera, University of Florida, Gainesville, Florida), all illustrated by Ferris (1977, figs. 68–72). The light male paralectotype (fig. 69) and both female paralectotypes (figs. 71, 72) are *L. helloides*, while the dark male paralectotype (fig. 70) is *L. florus* (all identified by J. Scott, and fig. 69 also identified by Barnes & Benjamin as noted above). Ferris (1977, p. 25) validly designated a male specimen, figured in fig. 68, as the lectotype of *Polyommatus castro* (he used the name *Epidemia dorcas castro*), but the identity of this lectotype is ambiguous. It is brightly-coloured like typical *L. helloides*: the blackish border of the brown forewing upperside is narrow like in *L. helloides* whereas it is wider in most *L. florus* (the border width divided by forewing length is the smallest of all five types, the lectotype and four paralectotypes); the blackish border of hindwing upperside (with its conical inward projections into the wide brown center of the wing) is most like *L. helloides*, whereas that border is wider in most *L. florus*; and the underside (especially on the forewing) is brighter, more like *L. helloides*. The number of orange lunules on dorsal hindwing resembles one of the most common variants of *L. florus*, but also resembles some uncommon variants of *L. helloides*. About 10% of *L. helloides* males in La Plata and Routt Counties in Colorado have a similar number of lunules and a similar percentage may have occurred in the mountains at Idaho Springs, Clear Creek Co.,

Colorado where the original collector would have travelled before the habitat was destroyed by construction. But only 1% or fewer males from the plains at Denver, Colorado have that number of lunules. I have seen 14 *L. helloides* that resemble the lectotype of *L. castro* in number of lunules. There are some good characters for distinguishing *L. florus* from *L. helloides*, as noted in para. 9 below, including egg morphology, time of flight during the season, altitude, association with larval hostplants, and electrophoretic alleles, but these characters can not be deduced from old museum specimens with missing locality data. All five specimens (the lectotype and four paralectotypes) are labelled 'P. Castro Reak. Col. [for Colorado] orig. type Coll. Reak.', and the lectotype also has a label 'Polyommatus castro Reakirt Rocky Mts.'. This locality is imprecise, and both *L. florus* and *L. helloides* occur in the Rocky Mountains and in Colorado. Based on historical records of the collector James Ridings (Brown, 1981, p. xii), Scott (2008a) was uncertain where the lectotype of *L. castro* was collected, though he determined that the paralectotype of *L. castro* that is conspecific with *L. florus* might have been collected near Empire, Clear Creek Co., Colorado, and the paralectotypes conspecific with *L. helloides* might have been collected near Denver, Colorado. Ferris chose the lectotype because he believed that this specimen best fitted Reakirt's original description. However, comparison of the type series of *castro* with the original description indicates otherwise, because the lectotype matches Reakirt's original description of males only by the dorsal forewing having dark black spots. Those spots are large both on the upperside and the underside, whereas the original description stated that the spots were much larger on the underside, which is true in the case of the two male paralectotypes representing different species. The original description of *Polyommatus castro* mentioned males with from one to four orange dorsal hindwing lunules, which fits all three males (lectotype and two paralectotypes) that also belong to two species, *L. florus* and *L. helloides*. Both female paralectotypes of *Polyommatus castro* (which are *L. helloides*) match females of *castro* that Reakirt called 'Var. Female' and that have a pale ochraceous dorsal forewing like *helloides*. Neither of these female paralectotypes match the other *castro* females Reakirt described, which may have been lost as they are no longer present in the type series. Without a neotype, some authors may use the name *L. castro* for the high-altitude species, and some may continue to use the name *L. florus* for it. Because the lectotype of *L. castro* is unidentifiable and lacks adequate locality data that could help identify it, a neotype is needed under Article 75.5 of the Code. Unfortunately none of the paralectotypes is suitable for a neotype because all lack adequate locality data.

8. Ferris (1977) considered *castro* to be the high-altitude Southern Rocky Mountains butterfly. His treatment changed the concept of the name *castro*, from a synonym of *Lycaena helloides* to a subspecies of *Lycaena dorcas* conspecific with *florus*. Later authors generally accepted the name *L. dorcas castro* for the Southern Rocky Mountains butterfly (Miller & Brown 1979, 1981; Miller, 1981; Hodges et al., 1983; Koçak & Kemal 2007; Pelham, 2008) and *L. dorcas florus* for the Northern Rocky Mountains butterfly. However, Austin (1998) used the name *L. helloides castro* for the southern butterfly and Scott (2006) used *L. castro castro* for it. Scott (1979, 1986) used the name *L. helloides florus* for the Southern Rocky Mountains taxon and later (2008a, 2008c) used *L. florus* because he doubted the identity of the lectotype of *castro*.

9. Recently the butterflies generally identified as *florus* and *castro* have been considered to belong to a different species than *L. helloides* and *L. dorcas* (Scott et al., 2006; Wright, 2008; Wright & Scott, 2008; Scott, 2008b). The two species *L. florus* and *L. helloides* are sympatric in various locations from British Columbia to Colorado and are distinguished by amount of orange on adults, average darkness of the wings, average size, number of generations per year and month of adult flight, egg sculpturing, larval hairs and larval foods. *Lycaena dorcas* is now considered to be a distinct species in a separate species group, differentiated by egg morphology (Wright, 2008), allozymes (Pratt & Wright, 2003), wing shape, wing pattern and preferred larval foods (Scott, 1979; Scott et al., 2006).

10. Scott (2008a) found that northern Colorado butterflies that Ferris treated as *castro* belonged near the middle of a cline. The butterflies in the Southern Rockies (southern Wyoming through Colorado to northern New Mexico) are not one uniform subspecies as was suggested by Ferris (1977). Scott (2008a) found that the amount of orange on the wings of adult butterflies increases southward in roughly clinal or step-clinal fashion from the Northern Rocky Mountains in Alberta – the type locality of *florus* – and Wyoming, south to northern Colorado – the type locality of *castro* – through southern Colorado to New Mexico, so he proposed a new subspecies *L. florus sangremar* Scott, 2008 (p. 47) (cited as '*L. florus [castro] sangremar*') for the New Mexico end of the cline. Northern Colorado individuals (*castro*) are more similar to those from Alberta (*florus*) than to those from New Mexico (*sangremar*).

11. If a neotype of *castro* conspecific with *L. helloides* were designated by the Commission, New Mexico butterflies would be called *L. florus sangremar*, while Northern Rocky Mountains butterflies and those in northern Colorado near the middle of the cline would be called *L. florus florus*. Thus the name *florus* would continue to be used for the species throughout the Rocky Mountains.

12. If a neotype of *L. castro* conspecific with *L. florus* were designated, New Mexico butterflies would be called *L. castro sangremar*, while those in northern Colorado would be called *L. castro castro*. Northern Rocky Mountains populations would be called *L. castro castro* by persons (such as J. Scott) who accept only two names for a cline, or *L. castro florus* by persons who accept three names. Thus the name *florus*, used for butterflies throughout the Rocky Mountains more than 96 times in 125 years, would be replaced by the less familiar name *castro* (treated as a junior synonym of *L. helloides* until 1977 and thereafter used only for the Southern Rocky Mountains taxon, and since 2006 restricted to the form from the smaller area of northern Colorado), and the usage of *florus* would be limited to a subspecies in the Northern Rockies by persons who can accept three names for a cline.

13. Thus, conservation of the name *florus* (by designation of a specimen of *L. helloides* as the neotype of *castro*) would make a greater contribution to nomenclatural stability than the preservation of the name *castro* (by designating a specimen of *L. florus* as the neotype of *castro*). Neither *florus* nor *castro* has been used very often: 97 usages for *florus* were found (35 listed above, and 62 in a separate list held by the Secretariat) versus 47 usages for *castro* (24 listed above, and 23 in the separate list). However, *florus* dominates in the scientific literature: in major butterfly books there are 5 usages for *florus* versus 1 usage for *castro*; in papers on taxonomic revisions and taxonomic matters 10 vs. 4; in morphology papers 5 vs. 1; in studies of hostplants &

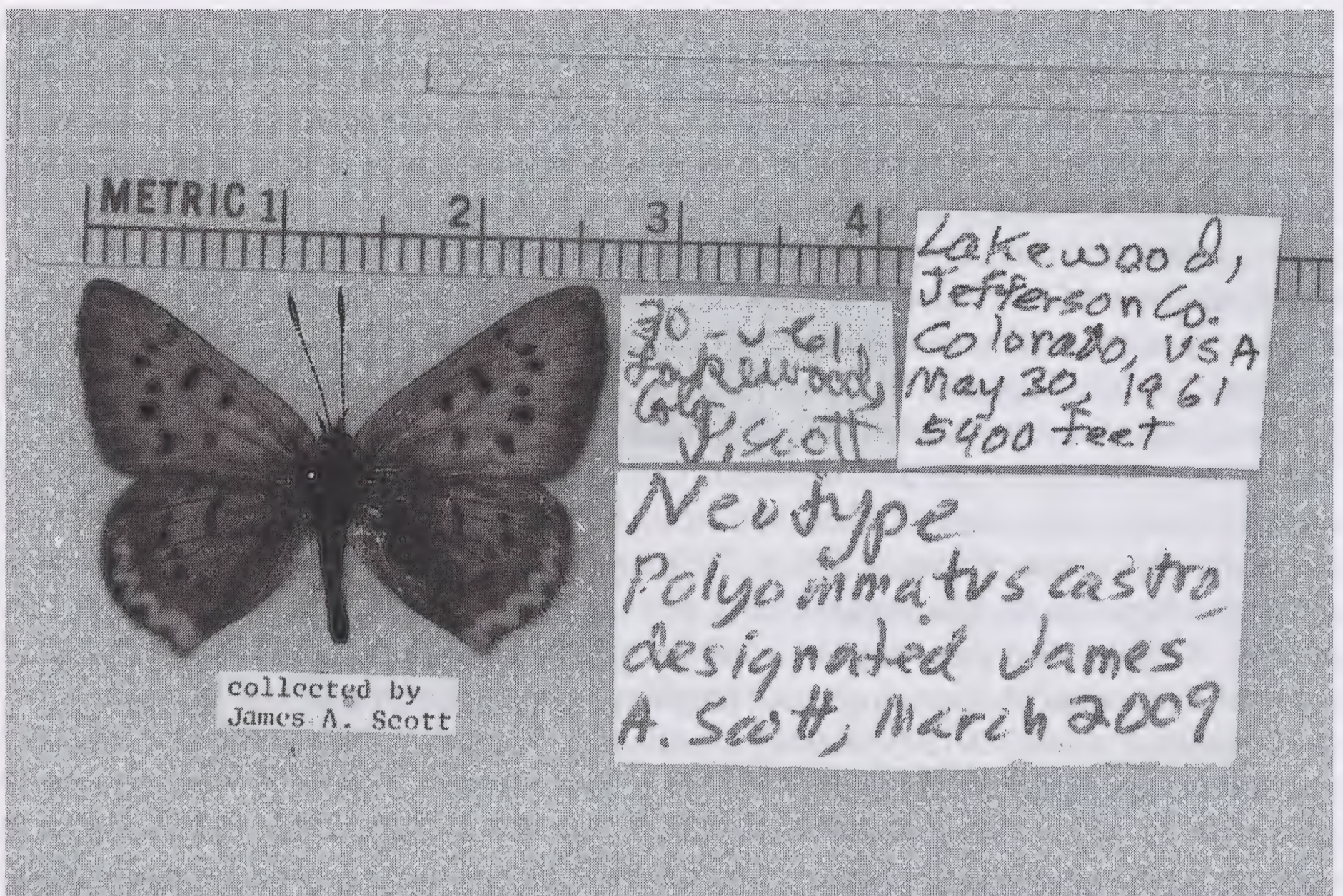


Fig. 1. *Polyommatus castro* Reakirt, 1866. Proposed neotype from Lakewood, Jefferson Co., Colorado, U.S.A.

ecology 4 vs. 0; in geographic distribution 20 vs. 7; in brief citations in checklists 14 vs. 17; it also prevails in internet use (online encyclopedias or museum databases or miscellaneous often non-taxonomic websites) 39 vs. 17. The above examples demonstrate the uninterrupted use of the name *florus* from 1884 to the present, its usage in the entire Rocky Mountains (compared to just the southern Rockies for the name *castro*), and its much greater usage in scientific publications, thereby justifying this application under Article 75.5 of the Code. Most usages of *castro* are simple mentions in checklists or internet databases of little scientific value.

14. It is proposed to designate as neotype a male specimen identified as *Lycaena helloides* from Lakewood (junction of Bayaud Avenue and North Balsam Street), Jefferson Co., Colorado 39°42'57" N, 105°5'16" W, (where its hostplants are *Rumex crispus* and *Polygonum pennsylvanicum*), 5400 feet altitude, collected 30 May 1961 by James A. Scott, to be deposited in the Natural History Museum, London. This locality is the lowest-altitude area presumably visited by the original collector of *Polyommatus castro*.

15. The International Commission on Zoological Nomenclature is accordingly asked:
- (1) to use its plenary power to set aside all previous type fixations for *castro* Reakirt, 1866, as published in the binomen *Polyommatus castro*, and to designate as the neotype a male specimen identified as *Lycaena helloides* from Lakewood, Jefferson Co., Colorado, to be deposited in the Natural History Museum, London, as specified in para. 14 above;
 - (2) to place on the Official List of Specific Names in Zoology the name *helloides* Boisduval, 1852, as published in the binomen *Polyommatus helloides* and as

defined by the neotype designated in (1) above (as the valid name for *Polyommatus castro* Reakirt, 1866).

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